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Journal of the Society of Arts.

FRIDAY, SEPTEMBER 21, 1866.

Announcements by the Council.

Examinations, 1867.

The Programme of Examinations for 1867 is now published, and may be had *gratis* on application to the Secretary of the Society of Arts.

In addition to the prizes offered by the Society of Arts, the Worshipful Company of Coach and Coach Harness Makers offer a prize of £3 in Freehand Drawing, and a prize of £2 in Practical Mechanics, to the candidates who, *being employed in the coach-making trade*, obtain the highest number of marks, with a certificate, in those subjects respectively.

Proceedings of Institutions.

Newton Heath and Failsworth Mechanics' Institution.—The inaugural address on the opening of the winter session of this Institution was delivered on Wednesday, September 5, by Dr. Pankhurst, in the lecture-room of the Institution. The chair was occupied by Mr. Elijah Dixon, President of the Institution, who briefly opened the proceedings. Dr. Pankhurst said the great object of education was to make the most of humanity, to enfranchise men from external and internal yoke, and put them in full possession of whatever might help them towards a higher progress. In that ministry of progress they had distinct stages, of which mention might be made. There was first the necessary knowledge coming after long labour and waiting; there was next the knowledge by added thought turned into power; and, finally, there was the power transmuted into help and happiness. Of those great laws of special amelioration it would be very easy to discover illustrations in every department and region of human activity. He would, however, take one that would be sure to come home to all present. Let them consider from that point of view that great monument of energy, enterprise, and skill—the cotton industry of Lancashire. He would mention three statistical facts recently furnished by Mr. Platt, of Oldham. It appeared, in the first place, that a pair of self-acting mules—one thousand spindles—requiring the attention of only one man and two boys, could produce in one week more than 21,000 miles of yarn; that, in the next place, from the 36,000,000 spindles constituting the total number at work in Great Britain there was produced 64,000,000 miles per day, or a length four times round the earth per minute; and that, lastly, the £200,000 worth of cotton yarn in 1760 had been in 1860 raised to £85,000,000. How were these results produced? They were, in the main, the creatures of the conjoint operation of the three great laws just stated. But there was one thing which presented itself to them of striking educational importance. Though there was no industry in which changes and improvements had been so numerous and rapid, yet the early and comparatively rude agencies of the first inventors—of Paul, of Arkwright, and of Hargreaves—rested upon and revealed substantially the leading principles which shone forth so eminently, and wrought so productively, in the last and latest improvements. This fact was of the utmost importance. Here they had in large illustration the great all-pervading truth that, though forms were transient, principles were eternal; therefore he who was master of the principles could command forms and manifestations at his will. From a single bone, found in some far-off cave, the naturalist, they knew, could re-construct the animal of which it formed a part; and from a flint hammer the antiquarian could infer the history and civilization of the men that used such instruments. In like manner a single fact, such as any one of those already mentioned, would be enough to evidence the greatness and power of the cotton manufacturers. Compare, then, the amount of work of one mule with the result of the labours of a number of the inhabitants of our extensive empire. In the action of principles, then, there was seen the highest results produced by the application of thought and mechanical power under the conditions of simplicity, specialization, and directness. But it would be little, in view of the present purpose, to say that principles were permanent and powerful, if yet it remained to be discovered how those principles were to be secured. But if the leading principles upon which the great process of industry and the arts depended were conspicuous for anything, it was for their accessibility. Whatever might have been the difficulty of the discovery in the first instance, when once established they became accessible to all. Nature herself stood ready to be interrogated of her choicest secrets, and any secret once known, even by only one man, became, on easy conditions, the property of all mankind. It was only necessary to begin at the beginning, to pursue the study of them earnestly, steadily, continuously, and here he might say patience was a sure prophecy of success. At that point it became a duty to exhort the students attending the classes of that Institution, and through them all the students of their union, to master the elements, for the elements were at once the first beginnings, and the last results of every science. It was in, and through, and by them that all the rest came. Processes of thought at first found practically impossible were subsequently performed in the first instance with difficulty and slowly, but repeated trials made them at last easy, rapid, and even instructive and pleasing. Above all, he would urge them to remember the great and inspiring effects of a high and settled purpose. Purpose was power. Such a purpose would constitute a perpetual and presiding energy—a constant power of selection, appropriation, and guidance. High principles and purpose gave a clearer view of the end, opened up a wide estimate of the means, and brought the latter to their fullest efficiency, by always keeping them in due relation to the former. In the result he would say that, though the friends of the students could and did sympathise with them, and offer them all encouragement, yet they would have to leave them there; they could only attend them to the gates of the arena. When once there the success of the student could alone depend upon themselves—upon the might of their energy, and truth of their devotion. He wished that the students should find a type of their object and procedure in that symbol of stability and power—the great ocean itself, which, though as to its surface is tossed with endless activity, as to its depths abides unmoved in calm eternal stillness.

EXAMINATION PAPERS, 1866.

The following are the Examination Papers set in the various subjects at the Society's Final Examinations, held in April last:—

(Concluded from page 677).

SPANISH.

THREE HOURS ALLOWED.

FIRST CLASS.

1. Render into Spanish the following passage:—

After Don Quixote had satisfied his hunger, he took up a handful of acorns, and, looking on them attentively, gave utterance to expressions like these:—"Happy times, and happy ages, were those which the ancients termed the golden age! not because gold, so prized in this our iron age, was to be obtained, in that fortunate period, without toil; but because they who then lived were ignorant of those two words, 'Mine and Thine.' In that blessed age, all things were in common to provide their ordinary sustenance; no other labour was necessary than to raise their hands and take it from the sturdy oaks, which stood liberally inviting them to taste their sweet and relishing fruit. The limpid fountains and running streams offered them, in magnificent abundance, their delicious and transparent waters. In the clefts of rocks, and in hollow trees, the industrious and provident bees formed their commonwealths, offering to every hand, without interest, the fertile produce of their most delicious toil. The stately cork-trees, impelled by their own courtesy alone, divested themselves of their light and expanded bark, with which men began to cover their houses, supported by rough poles only, as a defence against the inclemency of the heavens. All then was peace, all amity, all concord. The heavy coulter of the crooked plough had not yet dared to force open and search into the tender bowels of our first mother, who, unconstrained, offered, from every part of her fertile and spacious bosom, whatever might feed, sustain, and delight those, her children, by whom she was then possessed."—*Cervantes.*

2. Translate into English the following:—

Mandaron á un estudiante yendo á cazar que no hablase porque espantaria á los conéjos; y dijo cuando los vió, Ecce caniculi multi. Y como se espantasen y le rinesen, respondió:—? Quien habia de pensar que los conéjos sabian latin?

En una almoneda de los bienes de un mercader que debia mucho dinero, uno compró un colchon diciendo, que era bueno para dormir, pues *dormia* en el, hombre que debia tanto.

El Marques de Cortés decia que él que carecia de amigos, era como panal sin miel, espiga sin trigo, ó árbol sin fruto.

3. Explain the following idioms and proverbs:—

Al primer tapon zurrapas:—
Puesto en cuclillas.
El dar limosna, nunca mengua la bolsa.
El poco hablar es oro, y el mucho lodo.
El vino que es bueno, no ha menester pregonero.
En tu casa no tienes sardina, y en la agena pides gallina.

SECOND CLASS.

1. Translate into English the following extract:—

Acabó su historia aquel ladron, y comenzó otro la suya, diciendo que él era hijo de un mercader de Burgos, y que en su mocedad, llevado de una indiscreta devocion, habia tomado el hábito de cierta religion muy austera, de la cual habia apostatado algunos anos despues. En fin, todos los ocho ladrones habláron por su turno, y cuando, los hube á todos oido, no me admiré de verlos juntos. Mudaron luego de conversacion y propusiéron varios proyectos para la proxima campana, sobre los cuales tomáron su resolucion, y se fueron á la cama. Encendieron bujias, y cada uno se retiró á su cuarto. Yo seguí al capitan Rolando al suyo, y mientras le ayudaba á desnudar. Ahora bien, Gil Blas, me dijo, ya ves nuestro modo de vivir. Siempre estamos alegres. Entre nosotros no se dá lugar al tedio ni á la envidia. Jamás se oye aquí discordia ni disension estamos mas unidos que frailes. Tú comienzas ahora, hijo mio, á gozar una vida muy agradable, pues no té tengo por tan tonto que te dé pena el vivir entre ladrones.—*Le Sage.*

2. Point out the irregularities of the verbs *dormir* and *ir*.

3. Write the plural number of the following nouns:—*Bajá, aleli, rondó, fisú, café, canapé, pié, maravedí.*

4. Do the words *caos, génesis, nada, infanteria, caballéria, egoísmo, vandalismo,* admit of a plural?

5. Point out the gender of the following nouns:—*Planeta, sistema, sofisma, patriarca, sátrapa, tapaboca, poeta.*

THIRD CLASS.

1. Translate the half of the extract from "Gil Blas" (*Vide* Q. 1, Second Class).

2. Answer the grammatical questions (Ibidem).

3. Translate into Spanish the following phrases:—

Religion raises men above themselves; irreligion sinks them beneath the brutes: this binds them down to a poor pitiable speck of perishable earth; that opens for them a prospect to the skies.

Every person, whatever be his station, is bound by the duties of morality and religion.

We should implant in the minds of youth such seeds and principles of piety and virtue as are likely to take the deepest root.

FREE-HAND DRAWING.

THREE HOURS ALLOWED.

Candidates are not required to do more than one of the following subjects:—

1. Make a drawing of the time-piece as large as you can, on half a sheet of imperial paper.

2. Draw from knowledge the front view of a head looking up, and a head looking down, both the size of life.

3. Make a design illustrative of your occupation, and explain the subject in writing at the bottom of your drawing.

DIRECTIONS FOR THE LOCAL BOARDS.

Place a handsome time-piece on the chimney-piece of the room in which the candidates are to draw; or, if the chimney piece be in a dark or inconvenient part of the room, let the time-piece be raised on a table four feet from the ground.

GEOMETRICAL DRAWING.

THREE HOURS ALLOWED.

The constructions must be accurate, and show clearly, by plain and dotted lines, with appropriate letters of reference, the principles on which they are based. They may be put in ink or left in pencil, at the discretion of the candidate, provided they are distinct.

No deviation from the conditions of the questions can be admitted; and since no candidate must answer more than one question from any one section, he is advised not to attempt more than the time will admit of his completing, since little or no credit will be given for incomplete or inaccurate constructions.

I.

Construct a triangle from either of the following conditions:—

1. Its sides as 2 : 2·5 : 3 and circumscribing a circle of ·75 inch radius.

2. Its sides in the same ratio but inscribed in a circle of 2 inches radius.

3. Isosceles, its sides touching two circles in contact of 1 and ·5 inch radii.

II.

Construct a triangle from either of the following conditions:—

1. Its sides as 2 : 2·5 : 3, its area 4·5 square inches.

2. Equilateral, its area equal to a rectangle of 3 and 2 inches side.

3. Its base 3 inches, its vertical angle 40°, and its sides as 2 : 2·5.

III.

1. Inscribe a circle in a sector of 70° and 2·5 inches radius.

2. Describe a circle of 1·5 inches radius to touch a circle of 1 inch radius and a straight line 1 inch distant from this circumference.

3. Two concentric circles are 1 and 1·5 inches radii, draw a chord of the outer circle so that it may be divided into three equal segments by the circumference of the inner one.

IV.

1. Construct a quadrilateral A B C D, its sides A B = 2·5; B C = 3; A D = 4 inches, its diagonals at right angles, A C being 4 inches.

2. Construct a quadrilateral equal to the above in area, but its perimeter the least possible.

3. Construct a regular pentagon of 6 inches area.

V.

1. Three lines, each 3 inches long, meet in a point, each being at right angles to the other two; draw their plan when one is inclined at 25°, another at 50°.

2. Three indefinite planes are at right angles to each other and touch a sphere of 1 inch radius resting on the paper, one plane is inclined at 50°, another at 70°, show their intersections (or traces) with the paper, and mark the points in which they touch the sphere.

VI.

1. A square, of 2·5 inches side has its centre and two corners 3, 2·5; 3·5 inches above the paper; draw the plan of it and an elevation on a plane parallel to either diagonal.

2. Three corners A, B, C of a regular pentagon of 1·75 inch side are 1; 1·5; 2·5 inches above the paper, draw its plan and add an elevation on a plane parallel to the diagonal A C.

3. Draw the plan of a circle of 1·5 inch radius when two tangents to it which are at right angles are inclined at 30° and 40°.

VII.

A pyramid 4 inches high, has a regular pentagon of 1·5 inch side for its base, draw its plan when it is in one of the following positions:—

1. Lying on one face on the paper.
2. When the plane of one face is vertical.
3. When the planes of two faces are vertical.

VIII.

1. A cylinder 2·5 inches in diameter and 3 inches long, is terminated by a cone, 2 inches high, the two solids having a common axis, draw the plan of them when a straight line on the conical surface is either vertical or horizontal.

2. If the cylinder of the last question is cut by a plane making an angle of 70° with its axis, and passing through a point in the circumference of one end, draw the development of the surface cut off.

3. A sphere of 1·5 inch radius rests on the paper, and a cylinder of 2 inches radius also lies on the paper, and touches the sphere, draw their plan and mark the point of contact.

IX.

A box 28 inches long, 12 wide, and 9 inches deep in the clear, bottom and sides ·75 inch thick, is divided into two by a cross partition, and one of these divisions is again divided into two equal parts, these partitions being ·25 inch thick and their tops to be ·75 below the upper edges of the sides and ends—

1. Show this box in isometrical projection to a scale of $\frac{1}{4}$.

2. Show it in perspective, the eye being 5 feet from one corner and 2 feet above the plane of the top, the plane of the picture touching one upright edge, but equally inclined to front and end.

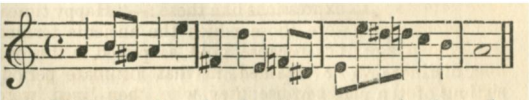
THEORY OF MUSIC.

THREE HOURS ALLOWED.

I. RUDIMENTS OF MUSICAL GRAMMAR.

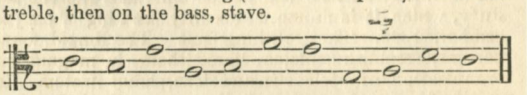
(*Nos.* 1 *to* 4 *must be answered* on music paper, *and in the order in which they are put.*)

1. Transpose the following a third higher.



2. Write the pluperfect fourth or tritone, in the scales of *Do* (C), *Re* (D), *Mi b* (E*b*), *Fa* (F), *Sol* (G), and *La b* (A*b*).

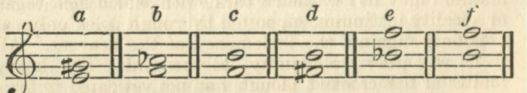
3. Write the following (at the same pitch) first on the treble, then on the bass, stave.



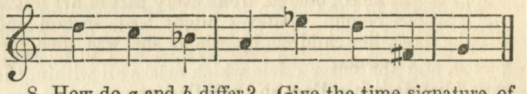
4. Write, from memory, any short tune, or passage of melody, with which you are acquainted.

5. How does the minor always differ from the major scale; and in what respects are the two sometimes alike?

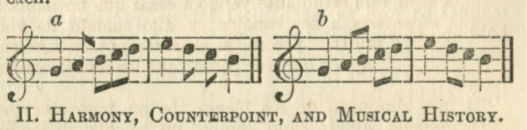
6. Name the intervals formed by the following.



7. In what scale or key is the following?



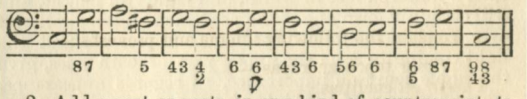
8. How do *a* and *b* differ? Give the time signature of each.



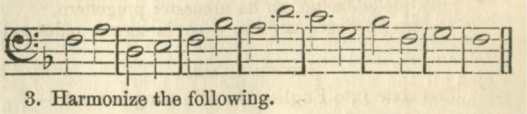
II. HARMONY, COUNTERPOINT, AND MUSICAL HISTORY.

(*Nos.* 1 *to* 3 *must be answered* on music paper, *and in the order in which they are put.*)

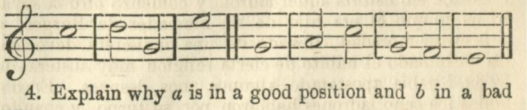
1. Add three parts to the following.



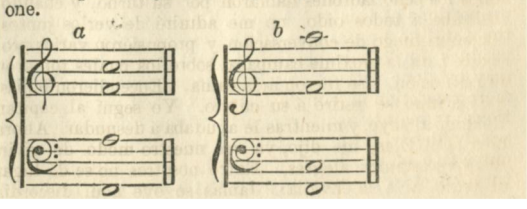
2. Add a part or parts, in any kind of counterpoint, to the following.



3. Harmonize the following.



4. Explain why *a* is in a good position and *b* in a bad one.



5. What is meant by a dissonant interval?

6. Give the rules for resolving a seventh, an imperfect fifth, and a ninth.

7. What notes of a scale are most often used as roots or fundamental basses?

8. Name the most distinguished composers of the modern German school, and state anything you know about their lives and works.

PARIS EXHIBITION, 1867.

A distinct order of reward of a novel character, consisting of ten prizes of £400 each, has been announced by the Imperial Commission, and British competitors for the rewards are to send in their claims on or before 1st November next, in order that, if the claims appear suitable, they may be transmitted to the International Jury, which it is announced will meet on the 1st December, 1866. These rewards are "in favour of the persons, establishments, or localities which, by a special organisation, or special institutions, have developed a spirit of harmony among all those co-operating in the same work, and have provided for the material, moral, and intellectual well-being of the workmen." Besides these rewards, there are twenty "honourable mentions." Moreover, one grand prize of 100,000 francs (£4.000) in addition may be awarded "to the person, establishment, or locality distinguished under this head by a very exceptional superiority."

Three jurors are assigned to the United Kingdom, and their names will be shortly announced.

The works in the Champ de Mars are proceeding with great rapidity; the whole of the framework of the iron portions of the building may now be said to be completed, and the outer circle which masks all within, the *grand nef*, as it is called, and which is to form the machinery and processes court, including in the latter manual as well as mechanical labour, presents a very bold and commanding appearance. There is little or no ornamentation connected with this exterior circle, or rather zone of the building, but its huge sides of plate iron, eighty feet high (walls there are scarcely any apparent), look light and elegant, in consequence of the clerestory, or range of windows, in three compartments, with arched tops, which occupy all the upper portion between the great pillars of the inner as well as the outer side. This *grand nef* is nearly a mile round, more than a hundred feet in width, and eighty in height, and will certainly form one of the noblest exhibition galleries ever constructed; the roof being unpierced, and the light coming in from the upper part of both sides, give this noble court an importance, as regards appearance, which a glass roof would be far from producing; there is plenty of light, without the cold or hot glare of a glazed covering. The clerestory, as already stated, occupies the whole of the upper portion of the sides; the corresponding spaces below are filled in with brick and plaster work, and in front is the alimentary court, in which all the cafés, restaurants, and other places of refreshment are to be placed; beyond this again is a jutting roof, forming a covered promenade, twenty feet wide, open to the park all round this outer circle of the exhibition. The grand nave is being rapidly covered in, and a large number of the window frames, the only portions of the zone which are in cast-iron, are in their places; when viewed from the park, beyond the gigantic proportions of this great court, its curved outline, and the fan-like appearance of the *marquise*, or verandah, produce an admirable effect, and show how much may be done without any extraneous ornament, by the mere repetition of simple elements, when good proportions are maintained throughout. The Commission has wisely determined not to mar the symmetry of this outer face of the building by any attempt at architectural effect in the way of porticos; there will probably be an entrance to the park of an ornamental character on the side of the quay, and opposite the main door of the building, and there will be many elegant structures in the grounds themselves, but these will all be at a sufficient distance from the building itself not to produce an unpleasant contrast with its bold, simple features.

The inner zone of the building, divided into two courts, a wide one for the Fine Arts, and one of smaller dimensions for the retrospective museum, or gallery of the *Histoire de Travail*, is, as has before been stated in the *Journal*, formed of solid stone walls, with partly-glazed roofs. The whole of the masonry has been finished for some time, many of the sections into which these two courts are divided are roofed in, and some have the glass in its place and the walls plastered. The *salles* of the Fine Art gallery, which occupy the straight sides of the building, are noble rooms, admirably lighted, but those which occupy the circular ends, and which form by far the largest portion of the whole, will give, we fear, great dissatisfaction, the walls presenting curves of small radius, the light falling in the most perplexing manner. In this inner zone of the building the curved form is a sad mistake. Between the great outer portion and the inner zone which we have just described, are the intermediate galleries, to be devoted to raw materials, furniture, clothing, ornaments, hardware, and all the remaining classes of the catalogue; the light cast-iron columns and partially glazed roofs here present a very pleasing effect, and the curvature of this portion, from its larger radius and the absence of division walls, improves its appearance. These intermediate courts are the most advanced of all; the roofs are being glazed, the louvre boards are in place, and in a few weeks they promise to be ready for the exhibitors.

The central garden, like the exterior of the building, will have an iron *marquise*, or verandah, all around it, but in a different style. This is nearly finished, and consists of a light and elegant cast-iron facia, supported by slender columns, whose plinths rest on steps raised above the garden level.

A large number of buildings are rising up in the park. In the first place there is a very large plain building, of three stories, on one side, communicating with the park as well as with the road without; this is to be devoted to the use of the juries, and probably in part to that of the Imperial Commissioners also. This building has been covered in for some time, and will shortly be entirely finished. At the opposite end of the park, near the quay d'Orsay, is another large building, not so far advanced, which is for the purpose of a club, to include all the ordinary features of such an establishment as far as they may be required for its temporary purpose, and also a large exchange or hall, for the use of exhibitors and those with whom they have business to transact. In another part, again, is a small ecclesiastical edifice, of which the roof is now nearly completed, and which is intended for the exhibition of all kinds of church furniture and decoration, interior as well as exterior. With this view the model church is provided with a transept, an apsis, a number of small chapels, and a profusion of windows. The admirable idea of thus forming a court in which all objects of ecclesiastical use or decoration may be exhibited in an appropriate setting, is said to have originated with M. Leveque, a well-known artist in stained glass, of Beauvais, who, with the sanction of the Imperial Commission and the aid of exhibitors and others, has raised this model Gothic church, which covers a thousand square yards of ground, and which, no doubt, will glisten next spring in all the splendour and with all the taste for which French artists, decorators, church jewellers, and others are so conspicuous. It is an excellent idea, likely to be well carried out.

Amongst the auxiliary buildings, erected or in course of erection, is a water tower for the supply of the building, steam engines, cascades and fountains, and two engine houses, pretty constructions in brick, with ornamental tiled roofs.

A kiosque is also being constructed, by order of the Sultan, who, it is said, will visit the Exhibition.

Another building is to be raised by order of the Viceroy of Egypt, to contain a large number of copies of the most celebrated monuments of that country, besides other objects of art and curiosity.

In one corner of the park considerable works are going on for the formation of the horticultural and piscicultural exhibition, which will form a large garden, with cascades and aquariums on a large scale.

Outside the precincts of the Exhibition, the railway station of the line which will lead direct to all parts of Paris as well as bring into communication all the lines starting from the city, is nearly completed, and the railway works in connection with it are under hand; the bridge over the opening made in the Quai d'Orsay, which will afford a direct entrance to the park from the landing place on the bank of the river is constructed, and the ornamental portions are now being completed; and lastly, the large space of ground in the Isle St. Germain, intended for agricultural experiments and other subsidiary purposes, is levelled and arranged. This ground is about a mile distant from the Exhibition.

Amongst the features talked of, but whether decided upon we are not informed, is the formation of a terrace on the top of the *grand nef* of the building, with ascent and descent by means of hydraulic lifts, from which a bird's eye view may be obtained of the park and the surrounding country.

The publication of the catalogue has been ceded to M. Dentu, the well-known bookseller of the Palais Royal, for the sum of £20,320; the catalogue is to consist of twelve parts, the first to contain the plans, tables, and documents relating to the exhibition; the second is to be devoted to the history of labour, or retrospective museum; and the remaining parts to the ten great groups into which the general contents of the exhibition is to be divided. The entire work is to be sold for five francs, and the separate parts at half-a-franc each.

The lists of intending exhibitors in many of the classes are now complete, and some idea may be formed of the show which will be made on the French side of the Exhibition. Classes 14 and 15 united, artistic furniture, upholstery, and decoration, numbers 220 exhibitors; class 17, porcelain, faïences, and other artistic pottery, 96 exhibitors; class 18, carpets, tapestry, and other tissues for furnishing purposes, 62 exhibitors; class 21, goldsmiths' work, 30 exhibitors; class 22, bronzes, fine iron castings, and repoussé work, 101 exhibitors; class 26, objects in fine leather and basket-work, and other small wares, 90 exhibitors; class 27, cotton fabrics and threads, 241 exhibitors; class 32, shawls, 28 exhibitors; class 34, hosiery, linen, and small articles of dress, 170, exhibitors; class 35, clothing, 215 exhibitors; class 36, jewellery and other ornaments, 153 exhibitors; class 39, toys and other small wares (*bimbeloterie*), 16 exhibitors; and class 46, leather, skins, and furs, 84 exhibitors; class 52, prime movers, generators, and machinery specially adapted to the purposes of the exhibition, 12 exhibitors; class 54, tool-making machines, 111 exhibitors; class 58, materials for and processes connected with furnishing and fitting, 41 exhibitors; class 59, paper making, dyeing and printing of fabrics and tissues, 80 exhibitors; class 60, machines, instruments, and processes of ordinary trades, 52 exhibitors; and class 62, saddlery and harness, 41 exhibitors. The classification differs so much from that of the former Universal Exhibition held in Paris, that of 1855, that it is impossible to make a comparison of the numbers; in the former there were only 27 classes, not including the fine arts; in the latter there are 96 classes, or, excluding the fine arts, 91. If we take the twenty classes of which the number of exhibitors are given above, as a fifth of the whole, we shall arrive at nine or ten thousand, which is little short of the total of 1855, which was 10,950, without Algeria and the colonies; there is no doubt, however, that the exhibition will be far in advance of its predecessor; and if, as is understood, the admission juries have, in accordance with the principles laid down by the Imperial Commission, set up a much higher standard of admission than formerly, a diminution of the number of exhibitors will be an immense advantage in every respect. It may be taken for granted that there will be no space to spare on the French side of the exhibition, and that the quality will be in keeping with the quantity. In looking over the lists many important names are not missing, and certainly the trades for which Paris and its neighbourhood are celebrated will be well represented. The same remark applies to those great industries, such as the cotton and hosiery trades; and there is no doubt that, whatever may be the number of exhibitors, the productions will show not only a considerable advance since 1855, but even since 1862. Since the preceding was written the list of admitted exhibitors in the class of manufacturing machinery has been inspected, and it appears that they amount to very nearly four hundred, and include the first firms in the empire.

The Imperial Commission attaches great importance to the tenth and last group in the classification adopted, namely, that which has for its object the improvement of the physical and moral condition of the population. The group is divided into seven classes, devoted to:—Materials and methods of infant education; books and materials for adult education; furniture, clothing, and food, distinguished by utility combined with cheapness; popular costumes of various countries; specimens of cheap, convenient, and healthy houses; productions of all kinds, manufactured by working men, having their own shop, and only assisted by their own family or one apprentice; and tools and methods employed by these little masters; forming together a complete economical exhibition.

As regards the products of master workmen, the Imperial Commission desires to see represented an important phase in the life of working men—that in which a man has arrived by his talent to the position of small master, and may hope at some future day to be at the head of a large establishment.

The class will include all kinds of productions, the only general characteristic being the conditions of their productions. Working men in visiting exhibitions have often seen the admiration of the public excited by the productions of their own hands, but which bore no trace of their name, and regretted that they could not exhibit objects conceived and executed at their own homes; or rather, perhaps, it should be said, that special facilities were not afforded them for that purpose; the Commission has therefore created a class in which every object shall be the production of an artizan, with or without the aid of his family and an apprentice, either for regular trade or sale.

In other classes of the exhibition the articles will be showed under the name of the manufacturer who has arranged for their production and assured their execution, but in the class under notice every article will reveal the hand of the actual producer.

Many small masters, who work at home for manufacturers, have feared to give offence to their employers by exhibiting on their own account, but the new classes introduced into the programme of the coming exhibition have been sanctioned by the manufacturers who take part in the management, so that it is hoped all jealousy will be done away with; and the object in view has been made known by various means of publicity in all parts of the empire, and special committees have been formed in the Departments, as well as in the capital, to carry out the project.

The productions in question are to be submitted to five committees of admission, and the whole of the articles accepted for exhibition will be exhibited previously, and privately, in the *Palais de l'Industrie* in the Champs Elysées, the Imperial Commission bearing the expense of their display in the preparatory exhibition

but the exhibitors paying for their own fittings in the Universal Exhibition itself. In order to make place for this preliminary exhibition, and for other operations connected with the exhibition, the collection of Algerian and colonial products, and all the fittings used for the exhibition of cattle, are now being removed from the building in the Champs Elysées. The offices of the Imperial Commission are at present in this building, and some departments will be retained there during the whole time of the exhibition, and this, with what we have stated above, shows how valuable it is to have such an edifice always ready for exhibitions of moderate extent, or for the preliminary and supplemental service of a great exhibition like that of the coming year. It should be mentioned, too, that in order to assist working exhibitors as much as possible, it is arranged that, in case of large articles, a deputation from the committees of admission will examine them in the workshop of the producer.

The works of fine art intended for the exhibition of 1867, limited to such as have been produced since 1855, are also to be collected in the Champs Elysées building, by or before the 15th of October; the jury of admission will commence its examination on the 10th of November, and announce its decisions by the end of the year. Great dissatisfaction has been caused by the very early dates fixed for this examination, as the works received for exhibition will thus be lost to their owners for twelve months, and it is feared that these regulations will have a damaging effect on the art portion of the exhibition; certainly five months seems a long period for selection and arrangement.

As regards foreign countries, much of the anxiety that was felt a short time since has passed away. It is certainly to be feared that the manufacturers of Bohemia, Moravia, and other countries, will not make such a show as they would have done had not the war interfered with all their operations, but both Austria and Prussia have supplied the Imperial Commission with the plans of their space and the list of their exhibitors.

As regards Spain, the government has formally announced its intention to take part in the exhibition, and has supplied its plan and a list of exhibitors, and intends to erect in the park some structures of considerable extent and importance. The Spanish Commission has issued pressing circulars to the local representatives on the subject.

The war in Italy will probably have an unfortunate effect on her manufacturers, but the Italian Commission has furnished the design for the façade of its portion of the building, and is about to commence its constructions in the park.

Switzerland is expected to be very well represented. Its section will be characteristically decorated with a façade in ornamental work, composed of pine wood, and bearing the escutcheons of the twenty-two cantons. She will have, amongst other things, curious archæological and ethnographical collections, and a complete series of the picturesque costumes of the country.

Egypt will present a very remarkable exhibition; a quadrangular building, with a colonnade all round, about 85 feet long by 60 broad, is being raised in the park, and will contain some of the most curious objects of art and antiquity in the country. This building will be a reproduction of the Ptolemaic temple dedicated to Hothor, with the greatest possible exactitude in all the details, and the execution of it has been entrusted to the learned Mariette Bey. Amongst the most interesting monuments and representations to be exhibited are—Ceremony of offerings to the gods, by Ptolemy; an authentic likeness of the famous Cleopatra, found by Mariette Bey last winter in a cavern at Denderah; bas-reliefs of various handicrafts, classed according to date; artistic representation of the epoch of the pyramids; the bas-reliefs from the tomb of Phtah hotép (Saqquarah), representing the deceased surrounded by his people, hunting scenes, combats of lions and buffaloes, fêtes and dances; bas-reliefs from the tomb of Ti, with scenes of rural life and labour; representation of various trades and arts, the navigation of the Nile, and other subjects, under the various dynasties; reproductions of the famous bas-reliefs and paintings of the Temple of Abydos, with a number of original statues and works of art, coffers and other objects. In addition to this large building, there will be two others illustrative of modern Egyptian life—one representing the habitation of a fellah of upper Egypt, with a small establishment for artificial hatching, a stable of dromedaries armed and caparisoned for war, and other animals, and an ethnographical collection; the other a horseshoe-shaped kiosk, in the purest Arab style, surrounded with plants and flowers of the country.

Outside of the kiosk native Egyptians will be seen practising the trades of the present day. In the interior of the kiosk will be a divan for the Viceroy of Egypt, who is expected to visit the exhibition, and an Oriental café, furnished with all its accessories. In the court will be a large plan, in relief, of the whole of Egypt, executed by order of the Viceroy, and under the direction of Colonel Mircher, the chief of the French mission in Egypt, and in the centre a fountain, composed of the alabaster of the country.

It will not be out of place to conclude this notice of the coming exhibition with the results of an inquiry into the sanitary condition of the mass of workmen employed on the works on the Champ de Mars. It appears that there has been no great agglomeration of population in the neighbourhood. Down to the 1st of April the number of persons employed did not exceed 800, but since that period it has increased to 1,477. Of these 472 live in distant quarters of the town, 300 belong to the establishment of Mar, Cail and Co., and make part of the resident population of the quarter in which the works are situated, and that of the whole number only 438 form an addition to the neighbourhood. The lodgings of these last have been frequently visited, and found to be in a satisfactory condition as regards health; and as the greater portions of these men are masons, whose work is finished, 300 of them have already been discharged. The result is that the accumulation of this large number of men on one spot has not given rise to any notable change in the condition of the quarter. This enlightened watchfulness for the well-being of the labouring classes reflects great credit on the authorities, and offers a valuable hint to those other places where large undertakings interfere with the temporary or permanent condition of the district.

BRITISH ASSOCIATION, 1866.

On a Proposed Use of Fluorine in the Manufacture of Soda. By Mr. Walter Weldon.

The following paper was read in the Chemical Section:—

The members of the Chemical Section are sufficiently familiar with the fact that when two equivalents of sulphate of sodium are treated with one equivalent of hydrochloric acid, one equivalent of the sulphate is converted into bisulphate and the other equivalent transformed into chloride. I am not aware, however, that any one had noticed, until I did so myself, that when sulphate of sodium is similarly treated with hydrofluoric acid a precisely similar reaction occurs, half the sulphate being converted into bisulphate and the other half transformed into fluoride. Now, among the differences between chloride of sodium and fluoride of sodium there is one which from a soda manufacturer's point of view is all-important, chloride of sodium requiring for its conversion into caustic soda a series of operations, one of them involving the intervention of a strong acid, whereas fluoride of sodium is convertible into caustic soda by one operation only, consisting simply in boiling with lime or with any one of several other metallic oxides. Upon this fact of the re-action between sulphate of sodium and

hydrofluoric acid thus yielding, without any destruction of sulphuric acid, a compound as readily caustifiable as carbonate of sodium itself, I believe it will prove practicable to base a manufacturing process by means of which soda shall be produced, not only, if not exactly without the use, at any rate without any consumption of sulphuric acid, but actually without the consumption of any materials whatever excepting salt and coal, all the re-agents employed being recovered for use over and over again continually. The first operation consists in the production of sulphate of sodium by double decomposition between chloride of sodium and sulphate of magnesium having associated with it at least one atom of water, the products, besides sulphate of sodium, being magnesia and hydrochloric acid; the second operation consists in treating the sulphate of sodium so obtained with hydrofluoric acid, thereby producing fluoride of sodium and bisulphate of sodium; the third operation consists in decomposing the fluoride of sodium obtained in the second operation by means of the magnesia obtained as one of the results of the first operation, and so obtaining caustic soda and fluoride of magnesium; and the fourth operation consists in the decomposition of the fluoride of magnesium thus produced in the third operation by means either of the bisulphate of sodium obtained in the second operation, or of its second equivalent of sulphuric acid separated in any convenient way, with re-production of sulphate of magnesium, with which to repeat the first operation, and of hydrofluoric acid with which to repeat the second operation. All the reagents employed for the transformation of salt into soda by this method are thus continually reproduced, the only materials consumed being the salt and a comparatively small quantity of fuel.

The second of the four operations thus described is remarkable, not only as transforming sulphate of sodium into a readily caustifiable compound without destroying its sulphuric acid, but also as not requiring any fuel at all, the reaction between sulphate of sodium and hydrofluoric acid taking place at ordinary temperatures. The sulphate of sodium and the hydrofluoric acid having been put together in a suitable vessel, which may be made of either lead, gutta percha, vulcanised india-rubber, or wood impregnated with paraffin, a little brisk agitation is all that is necessary to cause the reaction to be completely effected within a few minutes. On their being left at rest, the fluoride of sodium settles very readily, forming a dense precipitate, only slightly retentive of liquid, and admitting of the supernatant solution of bisulphate being separated from it very completely and with great ease. The third operation requires some fuel, but not much, the caustification of fluoride of sodium by means of magnesia, though requiring some special arrangements and precautions, being almost as easy as the caustification of carbonate of sodium by lime; and the fourth operation requires even less fuel than the third, the decomposition of fluoride of magnesium by sulphuric acid taking place, though perhaps not quite quickly enough, at ordinary temperatures, and proceeding with great rapidity when the temperature is only moderately raised. The only one of the four operations which requires nearly as much fuel as either of the furnace-operations of the ordinary soda process is the first operation. That operation may be performed either in the dry or in the wet way, either by heating a mixture of the two salts, or by dissolving them together and cooling the solution to about 24° Fah., by means of either Carré's machine or Kirk's machine, or any other convenient contrivance for producing artificial cold. It is somewhat easier to avoid loss of sulphuric acid when the decomposition is effected by the latter method than when it is effected in the dry way, and, as far as I can ascertain, the cost for fuel, labour, and wear and tear, of affecting the decomposition by means of Carré's machine is not only not greater, but it is somewhat less, than the cost for fuel, labour, and wear and tear, of a corresponding furnace operation. When, however, the decomposition of the chloride of sodium by sulphate of magnesium is effected in the wet way, there is required a further operation, consisting in evaporating the mother-liquors to dryness and heating the residue, in order to effect the decomposition of the hydrated chloride of magnesium, of solution of which the mother-liquor chiefly consists, into hydrochloric acid and magnesia. This further operation, however, only increases the total number of operations to five, or to just as many as are required for the conversion of salt into caustic soda by the ordinary process, the manufacture of the sulphuric acid used in the latter process being counted as one of the operations of it; while these five operations require so much less time than the operations of the ordinary process, that by this hydrofluoric acid process large charges of salt may be converted in caustic soda, in solution, within as little as from two to three hours. As compared with the process at present in use, therefore, the proposed process has the advantages of occupying less time, of requiring less labour, less fuel, and a far less costly plant, of producing no useless residue, and of consuming neither sulphuric acid nor lime. In fact, as I have said, the new process produces caustic soda without consuming anything whatever excepting salt and coal.

Having thus described a fluorine soda process which is practicable now, I proceed to a very brief mention of a shorter and simpler process, which, although it is not quite in perfect shape at present, I have fair reason for anticipating that I shall be able to carry out on a manufacturing scale at no distant date. Of all conceivable soda-processes, probably the simplest is that which would consist in decomposing chloride of sodium by means of steam, with production at one operation of caustic soda and hydrochloric acid. That reaction is practicable enough on the small scale, but there are difficulties in the way of carrying it out on the large scale which have hitherto proved insuperable, and which one can scarcely even hope to see overcome. Some, at any rate, of these difficulties, however, do not obtain as regards the decomposition of fluoride of sodium by means of steam, and for my own part my experience of this reaction has convinced me that its accomplishment on the large scale presents no difficulties which a little further persevering endeavour may not fairly be expected to overcome. In that case, the number of operations required for the transformation of salt into soda by way of the intermediate production of fluoride of sodium will be reduced to three, of which the first will consist in the production of two equivalents of sulphate of sodium by the reaction between one equivalent of chloride of sodium and one equivalent of bisulphate of sodium; the second operation, consisting in the production, by treating the two equivalents of sulphate of sodium thus obtained in the first operation with one equivalent of hydrofluoric acid, of an equivalent of fluoride of sodium, for conversion into caustic soda, and an equivalent of bisulphate of sodium, with which to repeat the first operation; and the third operation consisting in the decomposition by means of steam of the fluoride of sodium obtained in the second operation, with production of caustic soda, and reproduction of hydrofluoric acid, with which to repeat the second operation.

The hydrofluoric acid, whether produced by the reaction of steam on fluoride of sodium, or by that of sulphuric acid on fluoride of magnesium, must be condensed in a coke-tower, like that which is ordinarily used for the condensation of hydrochloric acid, but lined with either lead, gutta-percha, or wood impregnated with paraffin, or any other substance upon which hydrofluoric acid has not much action. When the hydrofluoric acid is obtained by means of sulphuric acid, it flies off at so low a temperature that its condensation is much easier than that of hydrochloric acid as at present ordinarily obtained; but when the hydrofluoric acid is produced by means of steam, it requires about the same amount of condensing power as is ordinarily needed for hydrochloric acid.

Lastly, it may be interesting just to mention that

fluoride of sodium can be produced by acting with hydrofluoric acid directly upon chloride of sodium itself. When strong hydrofluoric acid is added to a saturated solution of chloride of sodium, the whole instantly becomes milky-looking, and there is gradually formed a precipitate consisting of fluoride of sodium mixed with chloride of calcicum and fluoride of magnesium if any chloride of those metals was present with the salt, a quantity of hydrochloric acid equivalent to the fluorides formed being produced at the same time. By this method, however, only a part of the chloride of sodium is transformed into fluoride, but a much better result is got by passing hydrofluoric acid gas into the solution of chloride of sodium, care being taken first to cool the gas, and not to pass it in too rapidly; and there is reason to expect that by proceeding in this way, and by adopting other precautions, it will prove possible to convert chloride of sodium completely into fluoride.

The consumption of sulphuric acid in the British soda manufacture during the current year will probably amount to over 350,000 tons, the consumption of limestone to over half a million tons, the consumption of coal to about one and a quarter millions of tons, and the production of useless residue to at least a million and a half tons. The suggestion embodied in this paper, while preventing the production of any useless residue whatever, would save all the sulphuric acid, all the limestone, and probably half the coal, besides effecting other important economies. Before the next meeting of the British Association comes round I trust that the practical realisation of the suggestion will be an accomplished fact.

SUGAR CULTIVATION IN ENGLAND.

The following is from *Travers' Circular*:—When we regard the gradual introduction of beet sugar into so many European States, the question naturally occurs to us, how is it that in Great Britain alone, of all the great commercial nations, the culture of the beet should be unattempted. The European beet crop has now reached almost gigantic proportions, and this year amounts to no less than 600,000 tons. In France, the cultivation of the beetroot constitutes one of the most important and most remunerative articles of agriculture. An extent of land, equal to about 300,000 acres, is assigned for its cultivation; it keeps 468 manufactories at work; it gives employment to 70,000 hands, involving an expenditure of about one million sterling for labour each season, at a period of the year when more than at any other time employment is needed by the agricultural classes; it enriches the land in which the beet is sown, to the extent of at least 30 per cent., increasing the corn crops, and the number of the animals grazing on the pasture lands. In Austria, a country formerly dependent upon Holland for its supply of sugar, sugar cultivation is extending; and though the introduction of the beetroot dates only from the year 1830, there were, before the commencement of the recent war, 140 sugar manufactories at work, and employment given to 40,000 labourers of both sexes. Holland has recently entered on the same course, finding it profitable to cultivate beetroot sugar, even though she possesses sugar-producing colonies of her own. The great success of this trade in Prussia, the original home of beetroot sugar, and in the rest of the Zollvercin, is well known. According to a statement in Mr. Baruchson's pamphlet, there are even in Spain as many as twelve manufactories devoted to the manufacture of beetroot sugar. It is somewhat curious that, whilst enumerating the various countries that are supposed to be favourable to this cultivation, Mr. Baruchson finds no corroboration for his statement in the most recent official report on the subject —the answers drawn up by the Secretary of Legation at Spain in reply to questions addressed by Her Majesty's Government last year, whether sugar were cultivated in that country. In this report no mention whatever is made of the existence of beetroot manufacture, and the reader is left to infer that the whole amount of sugar in that country during the previous year, 1864, 20,000,000 quintals, was produced solely from the cane plantations in the Spanish colonies, Cuba and Porto Rico, although it is well known that cane sugar is cultivated near Malaga.

There is not much perhaps that could be urged in praise of our fiscal system, but at least the cultivation of the beetroot, if once it were undertaken, is never likely to suffer from such capricious and arbitrary regulations as those which accompanied its development in France. The most important fact in considering the sugar question in England, is that so far as cultivation goes, the beetroot is grown very largely all over Great Britain, and that the question of the extraction of sugar is not one of possibility, but of expediency. Mangold Wurzel is nothing but the common field beet, and contains from 4 to 7 per cent. of sugar; and the question is whether it would be commercially profitable to extract this product instead of giving it to animals. In considering the matter practically, it must not be forgotten that the pulp left after extracting the sugar is used on the Continent for exactly the same purpose as the whole root is with us. The question therefore is simply whether the value of the sugar extracted from the root would not more than repay the loss of weight for animal feeding. Certainly, if we may judge by France, it would be profitable, for the French farmers in the last crop are stated to have made a profit of 33 per cent. The mangold wurzel is not so rich as the Silesian beet, which contains about 10½ per cent. of saccharine matter. This plant is, however, simply a variety of the beet, and there is no reason why it should not be tried in England. In regard to the question, whether the Silesian beet or the mangold wurzel would be preferable, it is stated that the mangold wurzel, though poorer in sugar, is more productive as a plant. In the north of France the produce of the beet crop is stated by Mr. Baruchson to be, for a good average, 40 tons of root per hectare, or about 16 tons per acre, and that gentleman also confirms M. Payén's assertion that 5,000 tons of root produce 300 tons of sugar and 60 tons of molasses. The experiment of growing beet for the extraction of sugar was tried some years since in Ireland, but was abandoned, we believe, principally from the idea that beet sugar could not in the long run compete with cane. Since that time, however, beetroot has made immense strides, and the process has been so much improved that the yield from a given quantity of root has been doubled.

The obstacles that at first sight seem to oppose its introduction into Great Britain do not appear to be either fiscal or physical. In venturing an opinion, however, on a subject purely economical, and in which the relative advantage of growing one crop or another is influenced by the value of land or the price to be obtained by the crop, we speak under correction; and with the more diffidence, as the question of its possible manufacture in this country has perhaps never been discussed by one in a thousand of our landowners. Apart from the value of the article itself, the collateral advantages are hardly of inferior consequence, in the employment it affords in winter, at a time of the year when labourers are plentiful, and in the benefit it confers upon the soil in which it is grown. In many of our English counties mangold wurzel is so extensively grown that there would seem to be every opportunity for ascertaining the commercial success of this experiment, but in Ireland, circumstances would appear to be even more favourable to its growth. "The very circumstance," says Mr. Baruchson, "which is supposed to render Ireland not so fit as other countries for the growth of corn, makes it on that account peculiarly suited for the growth of crops which are cultivated on account of their bulbs, stems, and roots." Thus Ireland, which is subject to a greater amount of moisture than any other country where corn is grown, would seem adapted by nature itself for the successful cultivation of the beet. It is even stated by some that the

yield in Ireland would be at least half as much more per acre as in France, owing to the more favourable character of the soil, and the equally beneficial influence of a liberal expenditure of British capital. One special recommendation of the beetroot cultivation is that there is no part of this plant which is not capable of being utilized in some way or other for the service of man. And in corroboration of our remarks, we point to the following striking passage from the able pen of M. Dureau, the editor of the *Journal des Fabricants de Sucre*, quoted by Mr. Baruchson in his pamphlet:—"The beetroot, besides producing 200,000 tons of sugar in France, produces at the same time a mass of pulp beneficial to agriculture, which, excluding even all other food, is able to nourish, during one year, 50,000 head of cattle, or 500,000 sheep. The manure produced by these animals, added to the other residues of sugar manufacturers, can fertilise every year 20,000 hectares, or 50,000 acres. The 420 (since increased to 468) manufacturers now making sugar, employ from 60,000 to 70,000 hands, representing an outlay of not less than £800,000 to £1,000,000 for labour during each season. The 300,000 acres on which the beetroot is now planted were once fallow grounds, or unfertile soil. The crops of wheat, far from being diminished, have increased in an equal ratio. No other part of France produces more cereals than the north, and this is the very country where beetroot is cultivated to the greatest extent. Everywhere, after the cultivation of beetroot, the land has yielded one-third heavier crops than previously; thus, in manufacturing sugar, bread and meat are also increased, contributing largely to the public alimentation." The beet gave the basis for the succession of crops which was before wanting in France, but as we have carried out this system for many years, the results on the land would not be so surprising as in France. Considerations such as the above are, however, of sufficient weight and importance to invite the earnest attention of all interested in the sugar trade, and the general agriculture of the country. We do not pretend to give an opinion as to the practicability of making the extraction of Sugar from the beet commercially profitable, as a result can alone be arrived at by actual experiments. It would, however, appear that the question is well worth the attention of our farmers.

Fine Arts.

LOCAL ART EXHIBITIONS.—The importance of these exhibitions in France has frequently been mentioned in the *Journal*, and the report of that which took place at Bordeaux, in the present year, shows once more the value of such exhibitions. The collection included 632 works, and was open for eight weeks. There were 540 works for sale, and 115 found purchasers; the authorities of the town bought two paintings for the local museum; the private purchases amounted to 75, and a sum total equal to £1,318, although the sales fell off during the latter half of the period in consequence of the disquieting news of the war in Germany. The Society, under whose management the exhibitions take place, bought 38 works, and the total proceeds of the whole of the sales reached £2,210. This was the fifteenth exhibition of the Society, and the total sum obtained by sales amounts to £26,911. The Society receives assistance of various kinds from the Emperor, the Minister of State, and the authorities of the Department and of the town. It is agreeable to know that this local encouragement of art owes much to an English connoisseur, lately deceased, Mr. Scott, English Consul at Bordeaux, and President for several years of the Society in question. Another of the principal local exhibitions, that of Rouen, is about to open shortly, and an exhibition of works of the old masters, interrupted by the terrible ravages of the cholera, will take place shortly at Amiens.

DISCOVERY OF A PICTURE BY ARY SCHEFFER.—The other day, in examining the canvasses rolled up in the stores of the Louvre, a fine work by Ary Scheffer, which was supposed to have been destroyed at St. Cloud, in 1848, was discovered. The picture represents Louis Philippe on horseback, and surrounded by all his sons, and is considered to be the finest work of its class produced by the famous painter of Faust and Margarite and the Mignons. Ary Scheffer, it is well known, was a great favourite and almost intimate friend of the Orleans family, and was their companion when they left the Tuileries at the time of the Revolution.

Manufactures.

UTILISATION OF WATER PRESSURE IN TOWNS.—The greater part of Paris is but a height of five to ten metres above the mean level of the Seine, and the zero of the scale of depths at the Pont Royal is at 24·47 metres above the level of the sea. The waters of the Dhuys, which should furnish 40 to 50 thousand cubic metres per day, are at a height of about 84 metres above the level of the Seine. The waters of the Vanne, which furnish about 100,000 cubic metres per day, are at a height of about fifty-six metres above the Seine. These considerable heights, which correspond to pressures of from five to eight atmospheres, proceed from natural levels, and are not due to the action of any artificial elevating power, The waters of the Seine, to be had almost everywhere, furnish from 100 to 200 thousand cubic metres per day at a height of 40 metres above the level of the Seine at Paris. The waters of the canal of the Ourcq furnish about 100,000 cubic metres per day, at a height of 27 metres above the level of the Seine; and finally, there are the two artesian wells of Passy and of Grenelle, from which the daily supply is about 9,000 cubic metres. If these several supplies are multiplied by their corresponding heights, a total force of 17,660,000,000 kilogrammes is arrived at, or equal to a continual and uninterrupted steam power during twenty-four hours of 2,725 horses. But as this expenditure of water is used almost only during the day, the available power during twelve hours would become 5,450. It is this enormous power, at present almost all lost, which M. Maldant wishes to see utilised, and of which the utilisation seems to him, in many cases, to present as many facilities as advantages. Making an approximate estimate of the water used, for household and other purposes, the general conditions of which do not admit of its being utilised; allowing for a loss of power, due to a mean height of flow of water above the level of the Seine; finally taking also into account various uses, such as public watering roads with a jet, where the pressure is partially turned to account, it must readily admitted that more than half or one-third of the power previously stated can be utilised. Under these reduced conditions there still remains at Paris from about 2,000 to 2,800-horse power, which may supply hundreds of small industries in rooms where motive power is necessary, and where the use of steam or gas motive power is almost impossible. This power might also be profitably employed for industries requiring rather a considerable but intermittent power, such as the hoisting of material for building purposes, the "lifts" in hotels, railway stations, &c. Water may be obtained in Paris by yearly payment, at about fifteen centimes the cubic metre. Supposing that water under a pressure of about forty metres, and working a motive power that utilises about 75 per cent. of its total power, it will be seen that for fifteen centimes of water 1,000 kilogrammes of material may be lifted to a height of 30 metres, or 2,000 kilogrammes to 15 metres. The cost of maintenance and of supply to the motive power is very small, and would be estimated at a high figure if put at an additional cost of one-fourth of the ordinary cost of the water.

African Ornaments.—The following is by Mr. W. C. Aitken, of Birmingham, and is extracted from a recently-published work on the industries of that district:—A considerable quantity of the brass wire made in Birmingham finds its way to the Gold Coast, to Old Calabar, in the form of what are called "guinea rods," one hundred of which, each three feet in length, of Nos. 4 and 5 gauge in thickness, packed up in deal cases, and being at their destination sold in exchange for palm oil, &c., are used as the "circulating medium" by the natives, and at the death of the possessor are interred with the body. An influential Birmingham merchant states the orders from that country frequently amount to from five to twenty tons each. Large numbers of rings made of solid brass wire, about seven-sixteenths thick and three-and-a-quarter inches diameter, are also sent to the Gold Coast. A smaller size of brass wire (a little thicker than ordinary pin wire) is converted by being wound round spits into spirals like an ordinary check bell spring, and is also exported to the locality named for purposes of ornament and personal decoration. To the West Coast of Africa the wire is sent in rods or straight lengths, and to the East Coast in rings or coils, where its purchase is monopolised by the Banyan or Arab merchants immediately on its importation—Zanzibar being the chief depôt. Wire of the No. 4 and 5 gauge is generally preferred. When sent into the interior, the large 50lb. coils are sold at prices from 50s. to 67s., and are divided into three or four rings called "khata," for convenience of carriage, and attachment to the "banghy," or carrying pole. Native artizans at Unyanyembe convert the wire into the coil bracelets, a "khata" or ring of wire being sufficient to form two or three of these ornaments, each of which weighs about 3lbs. The "katinda," or coil bracelet, is sold, when made, for one dollar (4s. 2d.) each. The katinda bracelets were formerly made of copper wire, but its cost has been the means of introducing brass wire instead. Though the East African can draw fine brass wire, they import it from Zanzibar into the interior. The gauges preferred are from No. 22 to 25; this they convert into a variety of ornaments.

Commerce.

Telegraphs in Russia.—According to the statement of Professor Youze, there were sent, in 1864, by Russian telegraphs, 680,000 messages to the interior of the kingdom, 160,000 international messages, and 88,000 for the service of the empire, in all 928,000 messages. The average cost per message, in round numbers, is two roubles. The total receipts have increased since 1860 in the following proportions:—

	Annual Receipts in Roubles.
1860	940,000
1861	1,177,000
1862	1,369,000
1863	1,534,000
1864	1,724,000
1865	2,000,000

This last amount is only approximate, but in all probability it has been considerably more. The total expenditure in the telegraphic department, with cost of construction, maintenance of the wires, and other expenses, excepting only the cost of laying new wires, was from 1860 to 1864:—

	Roubles.
1860	829,000
1861	1,020,000
1862	1,270,000
1863	1,500,000
1864	1,680,000

Since 1861 long and costly lines have been established, having a great political importance, but little productive in financial respects; for example, the line from Kazan to Irkoutsk and Kiatkha, about 4,000 versts in length, but touching no important town. In the following table will be seen the gross receipts, the expenditure, and the net receipts for a verst of telegraphic line:—

	Gross Receipts.	Expenditure.	Net Receipts.
	Roubles.	Roubles.	Roubles.
1860	37·07	32·69	4·38
1861	36·40	31·57	4·83
1862	37·62	34·85	2·77
1863	33·46	32·69	0·82
1864	30·57	29·68	0·89

The cost of maintenance, with necessary repairs, amounts to 10 roubles per verst.

Schools of Commerce, Belgium.—M. Penot, at one of the meetings of the Industrial Society of Mulhouse, gave a summary of the information that he has collected at Paris, Frankfort, and Antwerp, on the Schools of Commerce that are established in these places. The school of Antwerp has particularly been deserving of his attention. He devoted eight days to the inspection of this school, and in taking the opinions of all the principal merchants in Antwerp; and M. Penot states that this institution thoroughly accomplishes the end for which it was intended. The teaching is at the same time theoretical and practical; it lasts two years, at the end of which the pupils undergo a final examination, composed of oral and written tests. M. Penot shows, quoting some passages from a final prize composition, how solid is the knowledge that is acquired at this school. Deserving pupils are sent abroad for a year at the expense of the Belgian government, with the title of *elèves consuls*, with the obligation of sending every three months commercial and statistical reports.

Progress of Railways in Egypt.—The branch line between Damanhour and Seh-Ibrahim-Dezughi, passing the place that will unite Mehallet-Roh to the Mansourah to Lephté branch, will be opened soon for traffic. Soon also will be opened a direct branch from Cairo to Mansourah, a line that offers great facilities to communication. Other lines are in course of construction, and before long the principal places in Lower Egypt will be united by rapid and commodious lines of railway.

Colonies.

Land Act, Queensland.—There is much interest attached to the land measure expected to become law during the present sitting of Parliament. A Land League has been organised at Brisbane, to forward the popular idea of the best way of remodelling the land laws. At present the majority seem to wish for a leasing clause, to enable lands to be taken on long leases at low rates of rent. Another idea is the adoption of a homestead law, to allow those who own no land to take up from 25 to 160 acres, at 5s. per acre, and have seven years to pay that amount in. As no title would be given until the seven years had expired, and no other land could be bought by the homestead selector in the interval, jobbing and speculation are out of the question.

Butchers' Meat Trade, Brisbane and Melbourne.—A considerable trade is now being carried on between Brisbane and Melbourne in the article of fresh butchers' meat, which has of late—since the cold weather set in—been shipped in large quantities. This, with the quantity of preserved meat now manufactured and shipped, will have a beneficial effect on the cattle market. Fat wethers are worth from 10s. to 11s., and bullocks £4 10s. In Melbourne bullocks of the same size and quality are worth £13 to £15. Heavy draught horses are in good demand.

New Zealand Shipping.—During the month of May

51 vessels entered inwards at the port of Dunedin, measuring 10,742 tons; and 55 outwards, measuring 13,774 tons. The total immigration for the month was 372 males and 54 females, 14 boys and eight girls—total, 448. Emigration, 334 males, 99 females, 45 boys, and 30 girls—total, 508.

TELEGRAPH IN NEW ZEALAND.—The Government have invited tenders for steamers to assist in submerging the Cook's Straits Telegraph Cable, which is expected in the *Weymouth*. It has been stated the White Bay, near Picton and Lyal's Bay, at the port of Wellington, are the best points to land the shore end of the cable. Wellington will then be placed in direct communication with all the principal towns of the southern island.

KEROSENE IN NEW SOUTH WALES.—The manufacture of kerosene is now fairly established, and the local market will in future be to a small extent supplied with a local article. The existence in the colony of deposits of the kerosene-bearing cannel coal has been known for some time. Different varieties, of different qualities, have been operated upon. The richest coal is that found at Hartley, and this is now being successfully worked for the manufacture of oil. The crude oil is prepared from the coal by the process of retorting. At present only nine retorts are set up; they are producing at the rate of nearly 1,200 gallons per week, but they are not worked up to their full capacity. The refining power is at present equal to 10,000 gallons a week. To produce 10,000 gallons of oil it will require 100 tons of cannel of the richest of that found at Hartley, so that at this rate of consumption the supply in store will last for a long while. The seam there is thick, and a single acre will furnish mineral enough for a year's supply at the rate of 100 tons per week.

STATIONS IN NEW SOUTH WALES.—There has been very little demand for station property during the past month. Choice fattening runs have been in demand, and anything of the kind would readily find buyers at full rates. The Bendemar Creek Station, in the Bligh district, was offered at auction, with 1,000 head of mixed cattle, and realized £3 5s. 6d. per head, the stores, stock, horses, &c., to be taken at a valuation. The Mount Connell Station, on the Burdekin River, Queensland, was sold, with 6,200 sheep and 750 head of cattle, for the sum of £8,000. Store cattle, there has not been much demand, and with the exception of one or two lots from choice Clarence River herds, no sales of importance have transpired. There will be considerable risk in droving cattle before spring sets in, notwithstanding the late rains, as there is but little chance of grass springing up during the winter.

PORT ADELAIDE.—The value of the imports and exports at Port Adelaide during the present year, up to 23rd of June, was £1,267,202, against £1,281,063 in same period of 1865. The value of the exports was £998,395, against £1,197,681 in 1865, showing a decrease in the imports of £13,861, and in the exports of £199,286.

SOUTH AUSTRALIA.—There is expectation of renewed efforts to explore "No Man's Land," and also of some attempt to open a track from Mount Margaret across the unknown region stretching into the neighbourhood of Shark's Bay. Major Warburton has again proceeded to Port August, with the view of again prosecuting the undertaking, if he finds that the appearance of the country will warrant the attempt. The present exploration is intended, in accordance with the instructions issued in 1864, to be confined within the boundaries of the colony. Major Warburton has twice attempted to force an entrance into "No Man's Land," but in both instances the want of water and bad state of the country compelled him to retreat.

NEW ZEALAND GOLD.—The total export of gold from the province of Otago, from the time of the discovery of the gold-fields to the end of the year 1865, amounted to 1,875,053 ounces; the exports for the several years having been—1861, 187,695oz.; 1862, 397,602oz.; 1863, 580,233oz.; 1864, 455,927oz.; and 1865, 253,696oz. Since the beginning of the year 69,784oz. have been exported, giving a total export since the discovery of gold of 1,999,531oz.

Forthcoming Publications.

ART-JOURNAL ILLUSTRATED CATALOGUE OF THE UNIVERSAL EXHIBITION, PARIS, 1867.—The proprietors of the *Art-Journal* announce their intention to issue, during the year 1867, an Illustrated Catalogue of the principal objects of Art-manufacture contained in the Universal Exhibition of the Works of all Nations to be held at Paris. The work will be of a similar character to those issued by the *Art-Journal* in connection with the Exhibitions of 1851 and 1862. The Catalogue will probably consist of 1,000 engravings, and will form part of each current number of that journal, the cost of which will not be increased. It will be edited by Mr. S. C. Hall, who edited the Illustrated Catalogue which accompanied the *Art-Journal* in 1851, and also that issued with the *Art-Journal* in 1862. He will be aided by an experienced staff; and the proprietors anticipate that labour, energy, and liberal expenditure will secure excellence in the several departments of the work. The editor solicits early communications on this subject from contributors, British and Foreign. Editions of this Catalogue will probably be published in French and in German, as well as in English; and an edition will also be issued in the United States of America.

Notes.

LAW OF COPYRIGHT.—The *Publisher's Circular* observes that "where competition exists, the publishing of uncopyrighted books cannot be any more profitable than the publication of copyrighted books. The question of American books production, moreover, could not be affected in any way by the establishment of international copyright. With or without copyright, books for the American market will be produced where it is, on the whole, and taking into account both natural and artificial obstacles, cheapest to produce them. With a Copyright Convention, the people of Great Britain and the United States would, in fact, as far as authorship and bookselling went, be practically one community; and the grounds for maintaining the arrangement would be precisely the same as those which have always induced the legislatures of each country to confer copyright upon its own authors."

EXPERIMENT IN ECONOMIC BUILDING.—A house nine stories high, in addition to the ground floor and basement, is now being built in the Quartier du Roule, in Paris, as an economical experiment. There is no staircase to the building, the means of attaining the upper floors being by hydraulic apparatus, such as is in use for building purposes, two large square tanks alternately filled with water, which serves as a counterpoise to the weight to be be raised. These tanks, which will carry an enclosed room with seats, are to move up and down once in a minute, and thus convey the occupants and their visitors up and down without fatigue, noise, or dust. It is calculated that, with this arrangement, the upper floors, from their superior airiness and prospect, as well as from their freedom from noise, will command higher prices than the others. The same means of mounting by hydraulic power is being adopted, it is said, in the new buildings in the Bank of France.

CULTIVATION OF ROSES.—It is well known that the rose gives rise to an important trade. The rose tree is regularly grown; it is generally a very productive cultivation. There are fields of rose trees in certain parts of France as there are fields of turnips elsewhere. The number of rose trees thus cultivated is taken at 500,000 for Orleans, 200,000 for Metz, 1,000,000 for Angers,

1,500,000 for Lyons, 2,000,000 for Paris, 2,000,000 for the thirteen communes of Brie-Compte-Robert. The varieties called tea rose, the Bourbon, and Mousseuse answer particularly well in Orleans and in the environs of Paris.

Correspondence.

CHEMICAL LABORATORIES.—SIR,—I have read with much pleasure the interesting abstract which has appeared in your *Journal*, of Dr. Hofmann's report to the Department of Art and Science, respecting the magnificent, I may say royal laboratories now being built in Prussia; I therefore hope you will excuse my troubling you with the following remarks, but the subject is so important that it deserves not only the attention of the Council of the Society, but its leading members; for no society in the United Kingdom has a better position, and commands more respect and influence than our Society, consequently it is its duty to take the lead in all matters that can promote art and science amongst our working and intelligent population. Although the Society has done much of late years to promote those branches of learning, having been the originator of universal exhibitions, and of local and national examinations, still I am of opinion that they should go a step further, and give a substantial help to those young men to whom it has awarded medals or honours, by enabling them to complete their studies in those branches of science for which they have shown an aptitude. I would therefore suggest that the Society should establish a laboratory, in which young men who have obtained honours might manipulate for say a year, so as to complete their knowledge of chemistry, and thus enable them to obtain good situations in our manufactories, and become useful managers or members of the same. There are at the present day but few branches of trade or manufactures in which a knowledge of chemistry or natural philosophy is not essential. Further, such a laboratory could be used by the members of the Society for pursuing experiments or researches in which they might be interested. Lastly, it would enable the Society to have not only courses on special subjects in the various departments of science, but it could then establish consecutive and complete courses of lectures, in which the elements of science and its various applications could be blended together, and thus become practically and generally useful to the members.—I am, &c., A MEMBER.

Patents.

From Commissioners of Patents' Journal, September 14th.

GRANTS OF PROVISIONAL PROTECTION.

Alcoholic liquids, manufacture of—2204—H. A. Dufrene.
Ammunition balls, preventing oxidation of—2215—W. E. Newton.
Boilers, cleansing flues of—2184—E. Green.
Boot-polishing apparatus—2200—E. Lamb.
Carriage axles—2226—J. Richards and R. Grindle.
Carriage-breaks—2203—C. E. Brooman.
Cartridge-cases—2222—W. T. Eley.
Cartridge-case extractor for breech-loaders—2227—T. Turner and W. Siddons, jun.
Chimney-pots or terminals—2208—J. Proctor.
Churns—2198—G. Haseltine.
Coffee-roasting—1756—S. A. Hodd and W. Upton.
Eggs, preserving—2172—W. E. Newton.
Embroidering machinery—1736—W. Clark.
Fabrics, folding—2175—R. Tonge.
Fermented liquors, preserving—2241—H. E. Newton.
Fire-arms, breech-loading—2196—E. Brooks.
Fire-arms, breech-loading—2209—T. W. and W. Barber.
Fire-arms, breech-loading—2231—W. E. Newton.
Fire-arms, breech-loading—2243—A. Albini and F. A. Braendlin.
Fire-arms and ordnance, breech-loading—2205—W. Krutzsch.
Floor-cloths—2180—F. H. Danchell.
Furnaces—2062—W. Mosley.
Gas, purification of—2201—W. Pierce.
Hats, &c., felting—2194—W. Clark.
Hydraulic pumps—1516—E. T. Bellhouse and W. J. Dorning.
Hydrostatic scales—2041—W. Clark.
Kilns, lime and cement—2179—P. A. De Berenger.
Lifting-jacks—2233—S. B. Simon.
Locomotive engines for steep inclines—2174—J. B. Fell.
Looms—2212—R. Buckton.
Looms—2229—J. G. Tongue.
Matches, cutting splints for—2166—T. Allen.
Metallic pistons—2178—J. Booth.
Motive-power—2164—A. Gerrard.
Motive-power engines—2011—C. and J. Pratt.
Muffs, combined with bags, &c.—2232—J. Loebl and I. Pick.
Organs, pianofortes, and melodeons—2181—W. E. Newton.
Packing for steam-tight joints—2064—J. E. Keirby.
Paper-hangings—1447—P. M. Balin.
Pulleys for hanging balance sashes—2216—H. Morgan.
Punching and rivetting machines—2158—R. H. Tweddell.
Railways and engines—2189—W. D. Gainsford.
Railway breaks—2219—J. H. Johnson.
Railway rails—2214—G. H. Bovill.
Railway signals and permanent way—2160—J. Livesey & J. Edwards.
Railway waggons, unloading—2193—S. Plimsoll.
Reaping and mowing machines—2182—E. T. Bousfield.
Reflectors—1541—E. P. H. Vaughan.
Saws, sharpening—1984—J. Parry and R. Morris.
Shawls, mantles, &c., fringing and trimming—2202—J. Northrop.
Sheep, dipping mixture for—2225—J. C. Dickinson.
Ships' propellers, prevention of fouling by ropes—2217—H. H. Hudson.
Shot-proof structures—2223—T. Whitby.
Slate-cutting—2192—G. Hunter and W. F. Cooke.
Smoke-consuming heater—2002—G. W. Fair.
Spool tubes and cartridge-cases—2213—J. Forster.
Steam-engines—2199—C. T. Porter.
Steam generators—2239—R. Daglish.
Steam-valves—2207—J. Farmer.
Sulphide of sodium, production of—1355—W. Weldon.
Tin drums for spinning machinery—2188—G. Little.
Urinals, water-closets, and taps—2183—J. G. Jennings.
Ventilating apparatus—2206—T. Davis.
Vessels and ships—2191—J. O. York.
Vessels, propelling and steering—2237—W. Clark.
Water, purification of—2218—R. Irvine.
Water, purification of—2230—J. Davies.
Wool, balling—2228—W. C. Brookes.
Wool-combing—2190—G. T. Bousfield.
Yarn and thread, winding—2176—H. Wren and J. Hopkinson.

INVENTION WITH COMPLETE SPECIFICATION FILED.

Leather, manufacture of—2325—E. Fitzhenry.

PATENTS SEALED.

787. T. J. Reader.
788. A. Pilling.
790. E. R. Wethered.
795. R. Badger.
797. R. H. Ashton.
798. J. Heaton.
807. E. Beacher and J. Gillott.
811. E. Field and F. Lloyd.
813. C. S. Osborne.
814. A. A. Croll.
816. H. King.
823. B. Swain and P. Oldfield.
830. F. P. Warren.
832. S. Dalby.
847. J. Jackson.
852. J. Macintosh.
863. C. E. Amos and W. Anderson.
866. B. Berry, jun., and G. Bromley.
869. F. A. Calvert.
876. J. Medhurst.
882. T. Silver.
893. W. E. Gedge.
950. G. Haseltine.
963. M. Henry.
973. G. Muller.
994. J. Patterson.
1223. C. D. Abel.
1318. G. T. Bousfield.
1348. A. V. Newton.
1360. W. Clark.
1518. G. T. Bousfield.
1817. W. Thompson.
1861. W. Thompson.

From Commissioners of Patents' Journal, September 18th.

PATENTS SEALED.

818. R. A. Jones and J. C. Hedges.
821. W. Naylor.
824. T. N. Kirkham, V. F. Ensom, and H. Brook.
825. P. G. B. Westmacott.
833. H. Stead.
834. C. E. Brooman.
836. C. H. Parker & H. Rossell.
842. E. D. Elliott.
843. S. Chatwood, J. and T. Sturgeon.
849. R. A. Hardcastle.
856. T. E. Symonds.
857. M. Archdeacon.
858. W. Whittaker & W. Lowe.
865. T. Ironmonger.
895. J. Bracher.
930. G. Hindshaw.
935. J. J. Derriey.
939. C. Turner.
978. C. J. Viehoff and J. A. Matthiessen.
1003. G. Davies.
1031. G. A. Ermen.
1103. A. Turner.
1476. G. Green.
1649. G. T. Bousfield.
1821. A. V. Newton.
1985. W. E. Newton.

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

2238. L. Desens.
2261. G. Howell.
2262. W. Thompson.
2328. G. T. Bousfield.
2267. J. Cox.
2287. P. McLaurin.
2272. B. J. Webber.
2299. H. W. Hart.

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

2080. J. Mason.
2213. W. Hartley.
2113. J. Luis.